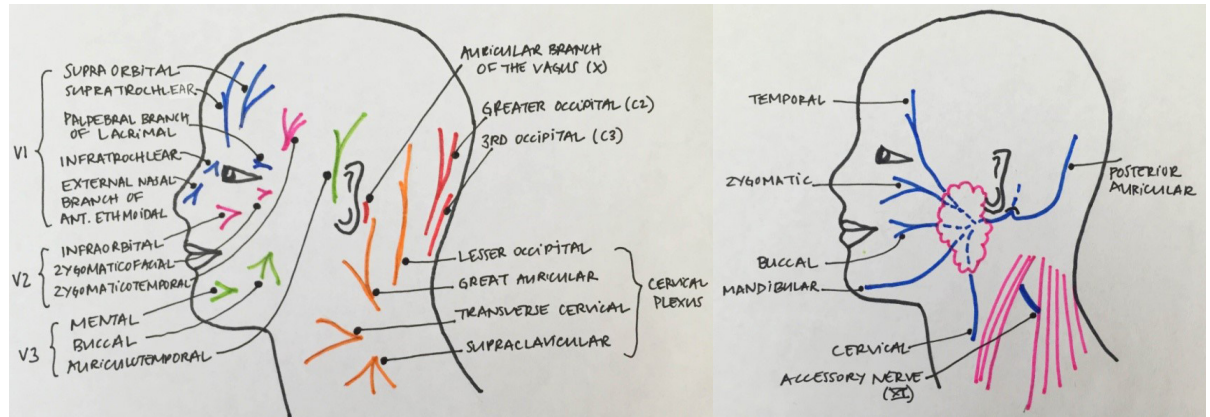


## Derm Surgery: Danger Zones and Relevant Anatomy

By Lance Chapman, MD, MBA; Dorota Korta, MD, PhD; and Patrick Lee, MD



**FIGURE 1: SENSORY INNERVATION**

Sensory innervation of the face is primarily from the 3 branches of the trigeminal nerve (CN V) — the ophthalmic nerve (V1), the maxillary nerve (V2), and the mandibular nerve (V3). Four branches of the cervical plexus innervate the head/neck. Innervation from the dorsal rami of the cervical nerves is also shown. The auricular branch of the vagus nerve (Arnold's nerve) supplies innervation to the skin of the ear canal, tragus, and auricle.

**FIGURE 2: MOTOR INNERVATION**

Innervation of the facial muscles is from the 5 branches of the facial nerve (CN VII). The nerve emerges from the stylomastoid foramen and passes through the parotid gland. The spinal accessory nerve (CN XI) is also shown in this diagram; it innervates the SCM and trapezius muscles.

### PLANES OF DISSECTION/UNDERMINING

Location	Plane	Structures to avoid
Scalp	Subgaleal	Scalp arteries (subgaleal plane is relatively avascular); Hair follicles
Forehead	Deep subcutaneous fat above frontalis fascia; subgaleal on large defects	Supraorbital and supratrochlear arteries and nerves; Subgaleal plane is relatively avascular
Eyebrow	Subcutaneous fat deep to hair bulbs (for larger defects, above frontalis)	Hair follicles
Eyelid	Above the muscle (orbicularis oculi)	Lacrimal gland and drainage system on lower lid; orbicularis oculi
Ear	Above perichondrium	
Nose	Upper 2/3 above the muscle; lower 1/3 above perichondrium	Nasociliary nerve, angular artery; deeper plane is relatively avascular
Temple	Superficial subcutaneous fat	Temporal branch of the facial nerve; superficial temporal artery
Cheeks	Mid-deep subcutaneous fat below hair follicles; above SMAS for larger defects	Parotid duct, buccal/zygomatic branches of the facial nerve; facial artery at melolabial fold
Mandible/chin	Mid-deep subcutaneous fat below hair follicles; above SMAS for larger defects	Marginal mandibular branch of the facial nerve; facial artery at cheek-chin junction
Lip	Above the muscle (orbicularis oris)	Branches of the labial artery; vascular orbicularis muscle
Neck	Superficial subcutaneous fat	Cervical branch of facial nerve and major blood vessels in anterior cervical triangle; spinal accessory nerve in posterior cervical triangle
Trunk/extremities	Deep subcutaneous fat/above the fascia	Larger veins in forearms, dorsal hands, and feet; peroneal nerve in lateral lower leg



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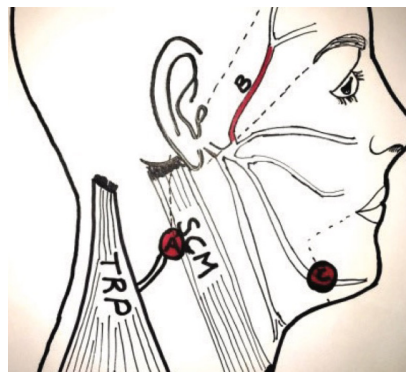


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## Derm Surgery: Danger Zones and Relevant Anatomy *(continued)*

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Sensory defect syndromes	Anatomy	Defect
<b>Frey's syndrome</b>	Injury to auriculo-temporal branch of CN V in parotid region	Carries both sympathetic nerve fibers (to scalp sweat glands) and parasympathetic nerve fibers (to parotid gland), so injury results in redness and ipsilateral cheek hyperhidrosis while eating
<b>Trigeminal trophic syndrome</b>	Injury or infection of CN V (gasserian ganglion)	Injury/infection can result in paresthesia, dysesthesia, anesthesia of nasal ala, leading to sickle-shaped erosions and ulcerations
<b>Herpes zoster on tip of nose</b>	CN V1 (ophthalmic nerve)	Both ciliary branch and external nasal branch come from nasociliary nerve, so herpes zoster on tip of nose can signify ocular involvement



**FIGURE 3: DANGER ZONES FOR MOTOR NERVE INJURY**

Nerve	Location	Function	Defect
<b>A: Spinal accessory nerve (CN XI)</b>	Identify the posterior triangle (boundaries are posterior border of sternocleidomastoid [SCM], anterior border of trapezius [TRP], and superior border of clavicle). Then draw a vertical line down from the mastoid process 6 cm to posterior border of SCM. Emerges within 2 cm of this point, called Erb's point (A).	Innervates trapezius muscle	Shoulder droop, winged scapula, inability to abduct arm
<b>B: Temporal branch of facial nerve (CN VII)</b>	Draw a line from the earlobe to the lateral brow. Then draw a line from the tragus to the HIGHEST forehead crease. Nerve courses through this zone before diving under frontalis muscle.	Innervates frontalis muscle	Ipsilateral eyebrow droop, inability to raise eyebrow, inability to close eye completely
<b>C: Marginal mandibular branch of the facial nerve (CN VII)</b>	Draw a circle centered on the mandible, approximately 2 cm lateral and 2 cm inferior to the oral commissure.	Innervates lip depressors	Ipsilateral lip elevation, drooling, crooked smile

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