Anatomy of the Neck

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KEYWORDS

• Neck anatomy • Plastic surgery • Neck lift

KEY POINTS

- Surgery of the neck is commonly performed by Plastic Surgeons.
- Neck anatomy and the location of important structures should be well known prior any neck surgery.
- Risks of complications are increased with secondary and tertiary surgeries.

Editor Commentary: *Garrett Wirth was the first resident to rotate with me in the new plastic surgery training program at the Aesthetic and Plastic Surgery Institute at the University of California, Irvine. I asked him to write about neck anatomy because I knew that he would take a dry subject and bring it to life. His important contribution sets the stage for safely treating the aging neck by understanding what structures lie beneath the skin. The danger zones can be avoided after reading and digesting this important subject*.

THE NECK AND ITS DIVISIONS

The neck is the region of the body between the clavicle and the mandible. If contains several vital structures (described later) and serves to separate the head from the torso. This discussion begins by describing the divisions of the neck and their contents. Subsequently, the layers of the neck are discussed and, finally, relevance with regards to surgery. Naturally, risks of complications are increased with secondary and tertiary surgeries.

Generally, the neck is clinically divided into an anterior triangle and posterior triangle. The anterior triangle of the neck is bordered by the following:

Anteriorly: the midline of the neck from the sternal notch to the chin
Posteriorly: the anterior margin of the sternocleidomastoid muscle
Superiorly: the mandible's inferior border

Anterior

The anterior triangle is further divided into 4 smaller triangles as follows:

Submental triangle (also known as suprahyoid triangle) is bordered by the hyoid bone inferiorly, anterior belly of the diagastric posterior/anteriorly, and the midline of the neck anteromedially. Its floor is formed by the mylohyoid muscle. This triangle contains submental lymph nodes and veins that subsequently join to form the anterior jugular veins. These veins are only at risk with very deep dissection; thus, injury is unlikely.

Submandibular triangle (also known as the digastric or submaxillary triangle) is bordered by the anterior and posterior bellies of the digastric muscle inferoanteriorly and inferoposteriorly, respectively. The superior aspect is bordered by the lower border of the mandible. This triangle contains the submandibular gland, facial vein and artery branches, and marginal mandibular branch of the facial nerve. The location of these structures deep to the platysma is significant during any neck operation. The location of the gland is relevant to any rejuvenation procedure involving the face/neck. The facial vein and artery must be protected for obvious reasons and damage to the marginal mandibular nerve has obvious deficits.

Carotid triangle (also known as the superior carotid triangle) is bordered by the anterior

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border of the sternocleidomastoid posteriorly, superiorly by the posterior belly of the digastric and the stylohyoid muscle, and anteriorly by the omohyoid muscle. Its floor is formed by the middle and inferior pharyngeal constrictors, the hyoglossus, and the thyrohyoid. This triangle contains several important nerves, arteries, and veins. The nerves include branches of the facial nerve, cutaneous nerves, hypoglossal nerve, vagus nerve, sympathetic trunk, accessory nerve, and internal branch of the superior laryngeal nerve. The arteries include the superior aspect of the common carotid artery and its bifurcation into the external and internal carotids. The external carotid branches in this triangle include the superior thyroid artery, lingual artery, facial artery, occipital artery, and ascending pharyngeal artery. The veins contained in this space are the internal jugular vein (lateral to the common and internal carotid arteries) and corresponding veins to the external carotid artery—which drain into the internal jugular artery. This area is thus high risk, and great care has to be taken in this region with certain maneuvers.

Muscular triangle (also known as the inferior carotid triangle): this is bordered by the midline of the neck, the anterior aspect of the sternocleidomastoid posteriorly, and the superior belly of the omohyoid superoposteriorly. It contains supraclavicular nerve branches and the sternohyoid and sternothyroid muscles—which lie over the common carotid artery, the internal jugular vein, vagus nerve, branches of the ansa cervicalis, inferior thyroid artery, recurrent laryngeal nerve, sympathetic trunk and the esophagus, thyroid gland, and trachea medially.

Posterior

The posterior triangle of the neck is bordered by the following: anteriorly—posterior border of the sternocleidomastoid; posteriorly—anterior border of the trapezius; inferiorly—middle third of the clavicle; and apex—nuchal line of the occipital bone.

The posterior triangle of the neck is further divided into the following two triangles by the inferior belly of the omohyoid muscle: occipital triangle and subclavian triangle (or supraclavicular triangle). The posterior triangle of the neck contains several important nerves, muscles, vessels, and lymph nodes. These include

- Spinal accessory nerve
- Branches of the cervical plexus
- Roots and trunks of the brachial plexus
- Phrenic nerve
- Subclavian artery
- Transverse cervical artery
- External jugular vein
- Inferior belly of the omohyoid
- Scalene muscles
- Splenius muscle
- Levator scapulae muscle
- Occipital and supraclavicular lymph nodes

Dissection above this level is safe and dissection below should be carried out on the deep aspect of the muscle.

The neck, enclosed by skin and underlying fascia, has its fascia divided into superficial and deep cervical fascia.

The superficial fascia surrounds the platysma, cutaneous nerves, external and anterior jugular veins, and superficial lymph nodes. This is more important when performing neck lift surgery.

The deep cervical fascia (less critical for neck lift surgery) is further divided into the following 3 layers (all of which form the carotid sheath):

1. Investing layer: this surrounds the sternocleidomastoid and trapezius muscles and surrounds the entire neck posteriorly.
2. Pretracheal layer: this surrounds the viscera of the neck (trachea, thyroid gland, esophagus, pharynx, and larynx) and strap muscles.
3. Prevertebral layer: this surrounds the prevertebral muscles and forms a sheath for the brachial nerves and subclavian vessels.

THE MUSCLES OF THE NECK

The Platysma

The platysma is a thin sheet-like muscle that originates from the fascia over the pectoralis and deltoid below the clavicle **Figs. 1–3**. Superiorly, it inserts at the base of the mandible, orbicularis, and angle of the mouth. The blood supply consists of a dominant pedicle (a branch off of the submental artery) and a minor pedicle (branching off of the suprascapular artery). The platysma is innervated by the cervical branch of the facial nerve. It functions to draw inferiorly the corners of the mouth and lower the lower lip as well. The activity of the platysma can be deceptive as the mouth can move—thus, injuries to the marginal mandibular nerve should still be considered. When the teeth are clenched it pulls the skin of the neck superiorly. The anatomy of the platysma varies. There are 3 main categories of the anatomic platysma variation involving its decussation. Type I is the most common, occurring in 75% of patients—this involves decussation extending up to 2 cm below