Surgical Anatomy of the Deep Fascia of the Neck

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Perhaps one of the most controversial subjects in the human body is the study of the deep cervical fascia. The description given by some morphologists about this fascia as a distinct continuous entity should be considered a myth. The students of anatomy are often confused by the diverse description and above all its variable development in different subjects. Nevertheless, the clinicians have always considered this to be important information because of its influence on the course of certain diseases of the neck.

The description given in the textbooks on the subject has been gathered through gross dissection on cadavers, histologic sections, injection of dye into fascial spaces, and also by clinical observation of certain diseases of the neck.

Investing Layer

Perhaps the most conspicuous part of this deep fascia is the one that surrounds the neck deep to superficial fascia and platysma, commonly known as the investing layer. This layer is attached posteriorly to the spines and supraspinous ligaments of the cervical vertebrae. Traced anteriorly it splits to enclose trapezius and sternomastoid muscles but remains united in between the two muscles, forming the fascial roof of the posterior triangle. At the anterior border of sternomastoid the two layers again unite and become continuous with the similar fascia of the opposite side forming the fascial roof of the anterior triangle. At the upper border it is attached to occipital, temporal, and mandibular bones, and splits in two places enclosing parotid and submandibular glands. At its lower border the fascia attaches to the sternum, clavicle, and scapula, and encloses suprasternal space (Burns) above the jugular notch and supraclavicular spaces above the middle-third of the clavicle.

Pretracheal Fascia

This is commonly described as the visceral fascia attached above thyroid and cricoid cartilages of the larynx. Traced downward it descends deep to the infrahyoid muscles and in front of the trachea and splits to enclose the thyroid gland. This layer has been traced through the inlet of the thorax into the superior mediastinum where it may blend with the fibrous pericardium of the heart. The part of this fascia between larynx and thyroid gland is often thickened and is referred to as the suspensory ligament of the thyroid gland (ligament of Berry). This may account for the up and down movements of the thyroid gland during deglutition.

Prevertebral Fascia

This layer has been described as extending between the sternomastoid muscles of both sides lying deep to the pharynx and esophagus and in front of the prevertebral muscles. The fascia also constitutes a fascial carpet for the muscles in the floor of the posterior triangle.
The fascia over the lower part of the posterior triangle is prolonged over the axillary vessels and the cords of the brachial plexus like a sleeve and is known as the axillary sheath.

**Buccopharyngeal Fascia**

This may be considered to be part of the prevertebral fascia lying in front of it, being separated from it by the retropharyngeal and retroesophageal spaces.

**Fascial Spaces**

The different layers of the deep cervical fascia enclose a number of spaces in between them. The lining of the spaces may not only prevent spread of infection from one area to another but also determine the direction of spread of infection. The various fascial spaces are as follows: (1) visceral compartment, (2) neurovascular compartment (carotid sheath), (3) retropharyngeal and retroesophageal spaces, (4) muscular compartment, (5) parotid space, (6) submandibular space, (7) suprasternal space (Burns), and (8) supraclavicular space.

**Visceral Compartment.** This space is bounded by the pretracheal layer anteriorly and the prevertebral fascia posteriorly, extending from the base of the skull above to the superior mediastinum below. Surrounded by loose connective tissue, the contents of this space are mainly the trachea, esophagus, and thyroid gland. Grodinsky and Holyoke described the anterior and posterior parts of this space as pretracheal and retrovisceral spaces. These authors stressed that these spaces are in continuity with each other and infection in these spaces may be transmitted to the mediastinum by anatomic pathways.

**Neurovascular Space (Carotid Sheath).** This space is probably enclosed by the pretracheal and prevertebral layers under cover of sternomastoid muscle extending from the base of the skull to the root of the neck. It contains common and internal carotid arteries, internal jugular vein, and vagus nerve, with arteries, vein, and the nerve occupying separate compartments.

**Retropharyngeal and Retroesophageal Spaces.** Between the prevertebral and buccopharyngeal fascia, these spaces extend downward from the base of the skull behind the pharynx and esophagus to the superior mediastinum. It may be emphasized here that these spaces constitute one continuous space behind the pharynx and esophagus, containing loose areolar tissue and retropharyngeal lymph nodes.

**Muscular Compartment.** The space is bounded by the investing fascia anteriorly and the pretracheal fascia posteriorly, and mainly contains the infrahyoid muscles, such as the sternohyoid, sternothyroid, and omohyoid.

**Parotid Space.** The parotid space contains the parotid gland, lymph nodes, facial nerve, retromandibular vein, and the external carotid artery and its terminal branches. The space is enclosed by the two layers of investing fascia in the interval between the mastoid process of the temporal bone and the ramus of the mandible. The space is usually completely occupied by the parotid gland and associated lymph nodes and the space may therefore be considered a clinical one, rather than an anatomic one. The thick fascia surrounding the space
undergoes considerable stretching during parotitis and this may account for the pain and discomfort.

**Submandibular Space.** This space is below the body of the mandible and enclosed by the two layers of the investing fascia and the submandibular fossa of the mandible. The space contains the submandibular salivary gland and lymph nodes and is separated from the parotid space by the stylomandibular ligament.

**Suprasternal Space (Burns).** The investing layer splits into two layers above the jugular notch of the sternum enclosing this space. It contains the sternal head of the sternomastoid, anterior jugular veins and jugular venous arch, and sometimes a lymph node.

**Supraclavicular Space.** This space is between two layers of the investing fascia above the middle third of the clavicle and contains the lower part of the external jugular vein, transverse cervical vein, and suprascapular vessels and supracleavicular nerves.

**Applied Anatomy**

The knowledge of the deep cervical fascia is considered important to clinicians, for it may prevent the spread of infection from one area to another by providing a fascial barrier. An infection in the visceral compartment may easily find its way into the superior mediastinum by the help of gravity and may produce serious complications. On the other hand an abscess formed behind the prevertebral fascia due to caries of cervical vertebrae may extend laterally behind the fascia and point at the posterior border of the sternomastoid muscle, or follow the axillary sheath to point at the axilla, or perforate the prevertebral layer to bulge through the posterior wall of the pharynx (retropharyngeal abscess).

With the advent of antibiotics and the ease of controlling infections, the practical importance of the deep cervical fascia has been considerably reduced. An excessive emphasis on the minute details of the disposition of the fascia is therefore trivial. Nevertheless, the knowledge of the fascial layers and spaces is often helpful to the clinician in understanding certain disease processes in the neck. Finally, the study of the disposition of the fascial layers at the dissection table should be considered as a worthwhile exercise and may provide the first step toward the learning of the intricate anatomy of the neck.