



## FASCIAL SPACES OF THE NECK: ANATOMICAL ORGANIZATION AND TOPOGRAPHY.

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**Abstract:** *The neck is a densely-packed anatomical region with many layers of fascia which become divided into compartments called fascial spaces. These areas are set up to be organized conduits for blood vessels, nerves and visceral organs with a clear topography. This narrative review discusses how the cervical fascia is organized according to its shape and the fascial spaces it creates, highlighting normal human anatomy as well as correct terminology to correspond to Terminologia Anatomica. A variety of peer-reviewed studies and well-established anatomical atlases were interpreted to obtain an elaborate description of the fascial layers, such as investing layer of the deep cervical fascia (lamina superficialis), pretracheal layer (lamina pretrachealis), and prevertebral layer (lamina prevertebralis). In addition, organization of the carotid sheath itself and important fascial spaces namely retropharyngeal, danger, parapharyngeal and visceral spaces is discussed. The layered structure of those fascial compartments demonstrates the principle of topographic anatomy as well as the definition of the structural boundaries which are necessary in order to understand the spatial relationships in the cervical region. The importance of having a good grasp on the anatomy of cervical fascial structures is supported for medical students, who would be better served by a systematic approach to training in the regional anatomy area.*

**Key words:** *cervical fascia; fascial spaces; deep cervical fascia; neck anatomy; Terminologia Anatomica; topographic anatomy*

### INTRODUCTION

The cervical region is a structurally complex anatomical area between the cranial base and thoracic inlet. It is an important conduit for the connective neurovasculature between head and trunk, and also contains the superior segments

of the respiratory and digestive systems. Structural support of the muscular body and proper spatial distribution among muscles, vessels and nerves in a relatively compact space are planned by several layers of fascia which coordinate their topographical and functional



compartments into distinct compartments where the different groups of visceral structures can be located together. The neck fascia is key to this organization. It has generally been divided into a superficial fascia and a deep cervical fascia which also have 3 main laminae: investing layer (lamina superficialis fasciae cervicalis), pretracheal layer (lamina pretrachealis fasciae cervicalis) and prevertebral layer (lamina prevertebralis fasciae cervicalis). Furthermore the carotid sheath (vagina carotica) generates a fascial condensation that encases key vascular and neural connections such as the common and internal carotid arteries, the internal jugular vein and the vagus nerve. Collectively, these fascial layers constitute a structure of compartments; those compartments are frequently termed fascial spaces, and constitute the basis for cervical topographic anatomy. These fascial spaces are not separate anatomical voids, but potential spaces formed through the patterning and interplay of fascial laminae. Their morphology underlies both embryological development and functional differentiation, forming the visceral, vascular, and vertebral divisions in separation. The compartmentalization creates mobility, minimizes interference of structure and offers a model for spatial relationships in the neck. However, the features of cervical fascia and its spaces have been described variably in the literature, despite the anatomical significance. Variability stems from

differences in nomenclature and the complexity in organizing three dimensions. The adoption of Terminologia Anatomica has greatly increased the consistency and precision of data; however, there remain varying points of articulation for the fascial boundaries and spaces; authoritative information cannot clearly delineate the three-dimensional boundaries and the spaces for the fascial boundaries. This review focuses on consolidating the present anatomical knowledge about cervical fascia and its fascial spaces in order to articulate organized data in a systematic way according to Terminologia Anatomica about them. The focus is on normal physical anatomy in humans, addressing only the clinical in terms of clarifying underlying structural principles. This work follows IMRAD formatting and is targeted as an academic paper at an undergraduate level and ready to be reported in a medical sciences journal.

## METHODS

This research adopts a narrative literature review style. Using scholarly anatomical and peer-reviewed materials, articles were selected because they show relevance to cervical fascia and the anatomy of the neck. The chosen sources were analysed qualitatively focusing on anatomical terminology, structure descriptions, and spatial relations. This synthesis illustrates the traditional anatomical principles and modern interpretations. The article provides a narrative literature review to elicit and



integrate descriptive anatomical contents of cervical fascia and fascial compartments of the neck. The materials relevant for the project were identified using search methods in PubMed/MEDLINE and Google Scholar, along with systematic reviews of well-known anatomical reference works, including Gray's Anatomy for Students, Snell's Clinical Anatomy by Regions and Netter's Atlas of Human Anatomy. The search was conducted with the keywords 'cervical fascia,' 'fascial spaces of the neck,' 'deep cervical fascia,' 'retropharyngeal space,' 'parapharyngeal space' and 'neck compartments anatomy.' All sources were chosen to comply with stringent inclusion criteria for normal adult human anatomy; publications discussing only surgical procedures, pathological disorders or pediatric anatomy were not included in the main synthesis, and referenced when applicable in order to clarify anatomical boundaries. Because of the descriptive and informative nature of the review, no specific quality evaluation tool was used; it has been deemed to be advantageous to search a good source with a strong basis in anatomy, as well as uniform terminology according to Terminologia Anatomica, and references from several independent references. In the Results section, all anatomical terms are first presented in English, and when there is any use of Latin terms in parentheses, their corresponding language is included.

## RESULTS

### General Organization of Cervical Fascia

The cervical fascia is conventionally divided into superficial and deep components. The superficial cervical fascia contains subcutaneous tissue, platysma, and cutaneous neurovascular structures. The deep cervical fascia (fascia cervicalis profunda) consists of three principal laminae: the investing (lamina superficialis), pretracheal (lamina pretrachealis), and prevertebral (lamina prevertebralis) layers.

The investing layer encircles the entire neck, enclosing the trapezius and sternocleidomastoid muscles, and forming the roof of several cervical triangles. The pretracheal layer is limited to the anterior neck, surrounding visceral structures such as the thyroid gland, trachea, and esophagus. The prevertebral layer forms a tubular sheath around the vertebral column and associated musculature, extending laterally into the axillary sheath.

Additionally, the carotid sheath (vagina carotica) represents a condensation of deep fascia that encloses the common carotid artery, internal jugular vein, and vagus nerve. It is not considered an independent fascial layer but rather a composite structure derived from contributions of the surrounding laminae.

### CLASSIFICATION OF FASCIAL SPACES

Fascial spaces of the neck arise between these layers and can be



categorized based on their anatomical position:

### Superficial Fascial Space

Located within the superficial fascia, this space contains loose connective tissue and allows for mobility of the skin over underlying structures.

### Visceral Space (Spatium Viscerale)

Situated within the pretracheal fascia, this compartment surrounds the cervical viscera. It extends from the hyoid bone into the superior mediastinum, maintaining continuity with thoracic structures.

### Carotid Space (Spatium Caroticum)

Defined by the carotid sheath, this longitudinal compartment extends from the cranial base to the thoracic inlet. It contains major neurovascular elements and serves as a central axis for cervical organization.

### Prevertebral Space (Spatium Prevertebrale)

Located between the prevertebral fascia and the vertebral column, this space accommodates deep cervical muscles and contributes to posterior structural support.

### Retropharyngeal Space (Spatium Retropharyngeum)

Positioned between the buccopharyngeal fascia and the alar fascia, this potential space extends from the skull base to the upper mediastinum. It separates the pharynx from the vertebral compartment.

### Danger Space (Spatium Periculosum)

Found between the alar fascia and the prevertebral fascia, this space extends uninterrupted from the cranial base to the diaphragm. It represents the deepest potential interval within the cervical fascial system.

## TOPOGRAPHICAL RELATIONSHIPS

The fascial spaces demonstrate a clear anterior-to-posterior organization. The visceral compartment occupies the anterior region, followed posteriorly by the retropharyngeal and danger spaces, and finally the prevertebral compartment. Laterally, the carotid spaces form symmetrical vertical columns that integrate vascular and neural pathways.

These spaces are interconnected through fascial continuities, forming a dynamic three-dimensional network. The arrangement allows for coordinated movement of the neck structures during swallowing, respiration, and head motion, while preserving compartmental integrity.

## DISCUSSION

Anatomical organization of cervical fascial spaces shows a careful balancing act between structural stability and functional adaptability. The deep cervical fascia has been laid out in layers, giving rise to compartments that divide and join different anatomical regions. The continuity in the fascial planes from the cranial base to the mediastinum illustrates this duality. On the topographic level, the neck can be thought of as composed of concentric and longitudinal



compartments. The visceral axis is the central anterior column and the vertebral axis is the posterior structural core. Interposed spaces, for example the retropharyngeal and danger spaces, constitute transitional zones which represent the layered nature of cervical anatomy. The carotid sheath is an important anatomical feature that brings together vascular and neural elements within a defined fascial boundary, making it an important organizational landmark. The fascial spaces of the neck can be

understood as interconnected or integrated entities rather than distinct spaces when examining the fascial structures of the neck and its anatomy. Their layout represents the principle of compartmentalization in human anatomy: fascial layers specify boundaries and pathways. Systematic insight into these relationships deepens spatial orientation and serves as a basis for additional anatomical and clinical research.

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