The Anatomy of Lamina Pretrachealis Fasciae Cervicalis

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Summary: The definitions concerning the fascia pretrachealis is either contradictory or insufficient in anatomy textbooks. The fascia pretrachealis is clinically important in the procedure of tracheostomy, mediastinoscopy and also in tracheal and bronchial trauma. The anatomy of the fascia pretrachealis (extension, relation and the attachments) was reexamined using cadaveric preparations and the clinical value of the fascia is reinforced. The fascia pretrachealis is attached to the upper brim and to the oblique line of the thyroid cartilage and continued its course on the anterior surface of the trachea and fused with the adventitia of arch of the aorta, posterior aspect of pulmonary artery and the pericardium. Laterally it is attached to the cartilagenous part of the trachea. Also controversial literature concerning description of the fascia pretrachealis has been evaluated.

In all parts of the body connective tissue forms structures to support or ensheath special tissue with defined anatomical shape, physical task and biological properties.

The fascia pretrachealis is part of the deep fascia of the neck which is little known, and hardly described in anatomy textbooks (Snell, 1881; Last, 1984; Williams, et al., 1989; Moore, 1984; Romanes, 1972). The fascia pretrachealis has great importance in the gliding movement of the trachea during swallowing.

Some of the statements we have come across in popular anatomy textbooks are debatable or actually contradictory. Snell 1981, describes this fascia to invest the infrahyoid muscles. Moore 1984, states that the fascia pretrachealis encloses the esophagus. In Gray’s anatomy 1989, we find the right description but erroneously the transverse section drawing, which the fascia pretrachealis encloses the sternohyoid muscle. Kamina 1983, describes the fascia pretrachealis in correct way but presents an erroneously drawing as well. The fascia pretrachealis, intimately is connected with clinical situations such as tracheostomy for resuscitation and rehabilitation, tracheal and bronchial trauma, mediastinoscopy (cervical and extended mediastinoscopy). Therefore, the anatomy of the fascia should be known well.

The lack of detailed description and the confusing statements concerning the lamina pretrachealis fascia cervicalis lead us to reexamine the anatomy of the fasciae via cadaver dissections and clinical experience. Moreover, literature concerning the fascia pretrachealis were evaluated.

Materials and Methods

The fascia pretrachealis of 5 male and 3 female cadaver, age ranged between 57—69 were examined. All cadavers were fixed with routine concentrations of phenol and formaldehyde solution which were donated to Marmara University, department of anatomy. The extend, attachments and the relations of the fascia pretrachealis were examined by fine dissection and clinical experience.

Result

The results are based on cadaver dissections and clinical experience.

The fascia pretrachealis is attached to the upper brim of the thyroid cartilage superiorly and to the oblique line laterally, which ensheathed the thyroid gland very firmly. No attachments to the cricoid cartilage were observed. The fascia pretrachealis continued down over the trachea (Figs. 1, 2). Laterally the fascia pretrachealis was attached to the edge of the cartilagenous part of the trachea on both side (Figs. 2, 3). The fascia pretrachealis in the thorax is
related to the vessels of the retrosternal area, then further downwards to the brachiocephalic vein, the brachiocephalic artery and terminally fuses with the adventitia of the posterior aspect of the arch of the aorta with the posterior aspect of pulmonary artery and the pericardium. Laterally, at the bifurcational area of the trachea, the fascia pretrachealis covers the angle between the trachea and main bronchus on either side, including the superior tracheobronchial lymph nodes (Figs. 1, 2). On the right it further, fuses with the vascular sheath around the superior vena cava and on the left with the sheath of the pulmonary artery. The fascia pretrachealis is considerably thick and dens at its lower end, while quite thin and translucent at its upper end (Fig. 3). During cervical mediastinoscopy, the lower dens portion forms a ring like structure which can be palpated at the lower end of the trachea, formed by the fusion of the fascia pretrachealis to the truncus brachiocephalicus. Clinically it is an important landmark to trace the inferior paratracheal lymph nodes.

The fascia pretrachealis is segmentally perforated by branches from the inferior thyroid artery, and veins on its posterolateral aspect, which supply the

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Fig. 1. A schematic drawing of the pretracheal fasciae (PTF) from the frontal view. It encloses the thyroid gland and continuous downwards in the superior mediastinum enclosing the trachea.
Anatomy of Lamina Pretrachalis

Fig. 2. The anterior thoracic wall of a cadaver has been removed, the pretracheal fascia (PTF) has been reflected off the trachea (T).

cervical portion of the trachea. The thoracic portion of the trachea is supplied by branches from the left bronchial artery which again perforates the fascia pretrachealis on either side. Also, branches from the recurrent laryngeal nerve perforates the fascia pretrachealis to reach the larynx.

Discussion

The fascia pretrachealis is not an apparent structure however, it is of practical importance for clinical reasons. Fascia pretrachealis is important in the gliding movement of the trachea during swallowing therefore, when enclosing an incisional wound at this region special care should be taken not to fix the fascia pretrachealis to the skin, because this would seriously limit the movements of the trachea (Rubio, 1982). Also inspection and biopsy from para-aortic lymph chain which are involved in upper lobe lung tumors can be achieved by extended cervical mediastinoscopy (Tobin, 1957; Miller, 1911; Meuser, 1978). The fascia pretrachealis acts as a guide or a landmark during the procedure of mediastinoscopy.

Sudden blunt trauma to the front of the chest may cause tracheal and bronchial lacerations and may result in mediastinal emphysema (Olson, 1971; Schöenberg, 1912; Eijgelar, 1970). An erroneous intubation for mechanical ventilation underneath the fascia pretrachealis has resulted in mediastinal emphysema has been reported by Rubio and colleagues 1982.

The space between the fascia pretrachealis and the trachea is termed as "axial mediastinum" according to Sarrazin and Voog 1971.

Von Hayek 1958, described this space as "spatium mediastinale superior" and further stated that this fascia was anchored to the base of the skull providing free movements of pharynx and larynx as well as esophagus and trachea. Within this space is located loose connective tissue, lymph vessels, lymph nodes and small blood vessels which pierces the fascia pretrachealis segmentally. Rubio and colleagues demonstrated the existence of this space around the anterolateral part of the trachea by the fact that after laceration of trachea and main bronchi the evading air is trapped within the fascia pretrachealis without pronounced mediastinal or cervical emphysema.

The fascia pretrachealis is usually confused with the fascia visceralis which is a separate sheath enclos-
Fig. 3. The schematic drawing of the pretracheal fascia (PTF) from the lateral view. Its attachments and its relations to the great vessels and lymph nodes are visualised.

The functional aspects also apply in radiodiagnostic of traumatic mediastinal pathology as well as for mediastinal lymph node biopsy. Therefore, this fascia deserves more attention in both anatomy and surgical textbooks.

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