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The simultaneous fascination and revulsion that has existed over the ages regarding dissection of the human body continues to the present day. This article discusses the historical aspects of thoracic anatomy and focuses on several major themes, culminating with the work (contributions) of Vesalius.

Anatomy of the Chest Wall

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A thorough knowledge of thoracic anatomy is of fundamental importance to the thoracic surgeon. Surface anatomy is an often-neglected component of traditional topographic anatomic teaching, but a proper understanding of the relationship of surface features to deeper structures is invaluable in the clinical assessment of a patient and in the interpretation of radiologic imaging. Familiarity with thoracic surgical landmarks is a prerequisite for the successful placing of a thoracic incision. Knowledge of the intrathoracic anatomy and level of the diaphragm based on surface landmarks is useful for interventional procedures, such as tube thoracostomy. Knowledge of the chest wall musculature is essential in the use of muscle flaps for reconstruction.

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Knowledge of the extrathoracic muscles of the chest wall is an important part of the armamentarium of the general thoracic surgeon. These muscles are principally important from an anatomic and surgical reconstructive point of view. A thorough knowledge of the extrathoracic muscle flaps is a prerequisite in the training of any cardiothoracic surgeon.

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As with all parts of the body, the anatomy and physiology of the chest wall are intimately intertwined. To carry out the unique functions performed by the chest wall, the anatomic structures are formed precisely for maximal efficiency. This article focuses on the unique structural characteristics in the internal thoracic diameters. It discusses the specific anatomy of the ribs and costal cartilages, along with the sternum. How these parts interrelate through joints is described also. Finally, it describes the muscles that cause the motion in the chest wall.

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This article provides a comprehensive account of the anatomy and physiology of the intercostal space, the knowledge of which is important for thoracic surgeons. A wide variety of clinical applications involve the intercostal space, ranging from simple inspection of a widened space in the emphysematous patient, to thoracentesis, to the surgical preparation of an intercostal musculopleural flap. Each of these procedures can be easier and safer if the intercostal anatomy is thoroughly understood. The precise knowledge of the relationships between the neuromuscular and osseous components within the intercostal space may help reduce pain and improve chest wall motility.

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Because the anatomy of the costovertebral angle is complex and often unfamiliar to the operating thoracic surgeon, surgical procedures performed in that area must be done by a surgical team rather than by individual surgeons, and such a team usually includes either an orthopedic surgeon or a neurosurgeon. This is the case, for example, of Pancoast's tumors invading the roots of the brachial plexus or the spine itself where the help of an orthopedic surgeon is invaluable not only to achieve a complete resection but also to prevent catastrophic complications.

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The term "thoracic outlet" is the area between the neck and shoulder, over the top of the thorax, and under the clavicle. Knowledge of thoracic outlet anatomy and the four major areas of compression is cardinal for the surgeon to perform thoracic outlet syndrome decompression without injuring major structures, having a minimal number of complications, and avoiding malpractice litigation.

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The structures of the chest wall and thoracic outlet are complex, so that a working knowledge of their anatomy and of its variations is essential to any thoracic surgeon working in the area. Correlating imaging with anatomy is just as important if one wants to recognize surgical indications and potential operating difficulties. In the past, conventional radiographic examination was the norm but interpretation was often difficult and

incomplete. Currently, CT and MRI are the best available imaging tools and they have complementary roles in the evaluation of chest wall anatomy.

Anatomy of the Airway and Lungs

Anatomy of the Neck and Cervicothoracic Junction

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Jean Deslauriers

Cervical approaches are used on an almost daily basis to access the cervical trachea, upper esophagus, and superior mediastinum. In addition to basic and scholarly knowledge of anatomy, thoracic surgeons must understand the anatomic relationship between the neck, the mediastinum, and both pleural spaces. This knowledge, as outlined in this article, forms the basis for the diagnosis and management of many aspects of pulmonary, mediastinal, and esophageal pathologies.

The Glottis and Subglottis: An Otolaryngologist's Perspective

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Dietmar Thurnher, Roger V. Moukarbel, Christine B. Novak,
and Patrick J. Gullane

The larynx is one of the most intriguing dynamic organs in the human body. It represents a model for complex harmonious coordination of functions. Its symmetrical structural anatomy, together with the finely coordinated muscle actions, facilitates essential functions, such as swallowing, adjusting voice tone, and airway protection. This review focuses on the glottic and the subglottic region. The anatomy of this area, with selected surgical considerations viewed from an otolaryngologist's perspective, is reviewed.

Glottis and Subglottis: A Thoracic Surgeon's Perspective

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Vicente Tarrazona and Jean Deslauriers

The surgical approach to diseases of the upper airway is a relatively new area of expertise for thoracic surgeons. The closer collaboration between thoracic surgeons and otolaryngologists, the improved methods that have become available for anatomic and functional evaluation of the larynx, and the operative successes have encouraged many thoracic surgeons to approach glottic and subglottic lesions with resective and reconstructive procedures. This article describes the anatomy and function of the glottic and subglottic regions as seen by the thoracic surgeon who operates in the area. Also shown are the limits of surgery and the consequence of the surgeon's actions with regard to the architecture and function of the larynx.

Anatomy of the Trachea, Carina, and Bronchi

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Douglas J. Minnich and Douglas J. Mathisen

This article summarizes the pertinent points of tracheal and bronchial anatomy, including the relationships to surrounding structures. Tracheal and bronchial anatomy is essential knowledge for the thoracic surgeon, and an understanding of the anatomic relationships surrounding the airway is crucial to the safe performance of many thoracic surgical procedures.

Lobes, Fissures, and Bronchopulmonary Segments

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Paula Ugalde, Jose de Jesus Camargo, and Jean Deslauriers

The clinical practice of thoracic surgery requires the surgeon to have intimate knowledge of pulmonary anatomy and of its variations. Attempts to perform thoracic procedures

without this knowledge can only result in incomplete operations or technical mishaps. Proper understanding of the anatomy of the pulmonary lobes, segments, and fissures allows the surgeon to correlate imaging, pathologic processes, and possible resectional procedures, thus insuring that each patient gets the best possible operation.

Pulmonary Vascular System and Pulmonary Hilum 601
William H. Warren and Frank J. Milloy

A surgeon must understand both normal anatomy and abnormal anatomy that results from developmental defects and pathologic processes. This article summarizes the normal anatomy of the pulmonary arteries and veins and bronchial arteries, emphasizing the normal anatomy and the anatomic variants that are the most common and are the most clinically relevant from a thoracic surgeon's perspective. Developmental abnormalities (such as partial anomalous pulmonary venous return, scimitar syndrome, sequestration, arteriovenous malformation) and pathologic vascular conditions (such as pulmonary artery aneurism, Swyer-James syndrome) are beyond the scope of this article.

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Marc Riquet

Bronchial arteries and bronchial lymphatics participate directly in the normal and pathologic conditions of the lungs and are of more than academic interest. Bronchial arteries and bronchial lymphatics usually are discussed separately, but they are linked when considered anatomically or physiologically. This article describes these highly variable structures.

Correlative Anatomy for Thoracic Inlet: Glottis and Subglottis; Trachea, Carina, and Main Bronchi; Lobes, Fissures, and Segments; Hilum and Pulmonary Vascular System; Bronchial Arteries and Lymphatics 639
Paula Ugalde, Santiago Miro, Éric Fréchette, and Jean Deslauriers

The radiologic assessment of normal and abnormal thoracic anatomy relies on an entire array of modalities, starting with standard chest roentgenograms, silver-based or digital. Because of their physical principles and applicable fields, however, CT, MRI, MR angiography, positron emission tomography, or positron emission tomography-CT bring invaluable and complementary anatomic and functional information. This article explores these different radiologic modalities as they apply to the anatomy of the thoracic inlet, glottis and subglottis regions, main airways, lungs including segments and fissures, hilar structures, and bronchial arteries and lymphatics.

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